



“XEROX”, “PHOTOSTAT” & “QWIKPRINT” TRIO REFER TO MAKING PAPER COPIES OF DOCUMENTS, BUT ONE IS A FAMOUS BRAND NAME AND THE OTHER IS AN OLDER PHOTOGRAPHIC PROCESS

¹Dr. Dhrubo Jyoti Sen, ^{1*}Subhajit Samanta and ²Sruti Mahapatra

¹School of Pharmacy, Techno India University, Salt Lake City, Sector-V, EM: 4/1, Kolkata-700091, West Bengal, India.

²International Institute of Pharmaceutical Science and Research, Phase II, Plot No. A: 12-15, Kalyani Industrial Estate, Nadia-741235, West Bengal, India.



***Corresponding Author: Subhajit Samanta**

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ABSTRACT

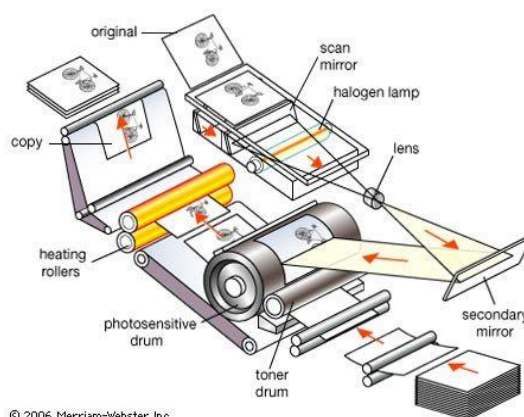
Xerography is a dry printing and photocopying technique invented by **Chester Carlson** [Chester Floyd Carlson (February 8, 1906 – September 19, 1968) was an American physicist, inventor, and patent attorney born in Seattle, Washington.] A Xerox machine or printer has external user parts like the document glass, paper trays, and control panel, as well as internal hardware components like the toner cartridge, fuser assembly, and transfer roller. You can find specific replacement items directly through Xerox Supplies and Accessories. Xerography is a dry electrostatic copying process that uses light and electrical charges to duplicate documents. The word comes from the Greek roots xeros ("dry") and graphos ("writing"). Chester Carlson invented it in 1938, and the Xerox Corporation commercialized it with the first automatic plain-paper copier in 1959. Xerox is an endless copy after copy.

KEYWORDS: Xerox, Photostat, Toner ink, Photocopier, Xerography, QwikPrint

INTRODUCTION

Using a Xerox machine (photocopier or multifunction printer) offers high-speed printing, multi-tasking

capabilities, and sharp text quality. However, they come with high upfront purchase costs, bulky physical sizes, and ongoing maintenance expenses for toners and parts.



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Figure-1: Photo stat.

External and User Parts

- **Control Panel / Touchscreen:** Screen to change settings and start jobs.
- **Document Glass and Cover:** Flat glass where you put paper to scan or copy.
- **Automatic Document Feeder (ADF):** Top tray that feeds multiple pages automatically.
- **Paper Trays (Tray 1–4):** Drawers that hold blank paper.
- **Bypass / Tray 5:** Special slot for thick paper or envelopes.
- **Output Tray:** Area where printed pages land.

Internal Working Parts

- **Toner Cartridge:** Holds the black or color powder used to print.
- **Imaging Unit / Drum:** Puts the image pattern on the paper using static charge.
- **Transfer Roller / Belt:** Moves the toner from the drum onto the paper.
- **Fuser Assembly:** Uses heat and pressure to melt the toner permanently onto the paper.

- **Feed Rollers:** Small rubber wheels that pull paper from the trays.

Carlson invented electrophotography (now xerography, meaning "dry writing"), producing a dry copy in contrast to the wet copies then produced by the Photostat process; it is now used by millions of photocopiers worldwide] in 1938. It uses electricity and light-sensitive materials to attract and fuse fine powder (toner) onto paper without using any liquid chemicals.

How the Process Works

- **Charging:** A light-sensitive drum gets a full electrical charge.
- **Exposure:** Light hits the drum from a document, and the charge fades where the light shines.
- **Development:** Dark powder (toner) sticks to the remaining charged parts.
- **Transfer:** The powder moves from the drum onto a sheet of paper.
- **Fusing:** Heat and pressure melt the powder permanently onto the paper.



Figure-2: Chester Carlson; inventor of xerography [Xerox].

History and Uses

- **Name Origin:** The name comes from Greek words meaning "dry" and "writing".
- **Commercialization:** Developed by the company that became the Xerox Corporation.
- **Modern Uses:** Found in most standard office copy machines and laser printers.

Advantages

- Fast Speed:** Prints and copies large stacks of paper quickly.
- High Volume:** Built to handle heavy, daily workloads without breaking down easily.
- Multi-Function:** Combines printing, scanning, copying, and faxing in one device.
- Cost-Effective Bulk:** Low per-page cost when printing large numbers of documents.
- Good Quality:** Produces clear, sharp text and stable images.

Disadvantages

- High Cost:** Expensive to buy new, especially advanced office models.

Large Size: Takes up a lot of floor or desk space in a room.

Power Use: Consumes significant electricity, often staying on all day.

Maintenance: Needs regular servicing, and toner cartridges can be expensive.

Noise: Can make loud mechanical noises while running. Xerox high-speed printers and multifunction systems deliver over 50 pages per minute (ppm)—with heavy-duty production models reaching up to 65, 75, or 81 ppm. Popular high-speed lines include the Xerox PrimeLink Series and Xerox AltaLink Series designed for busy offices and print shops.

Performance and Features: High-volume output exceeding 50 to 80+ ppm.

Advanced color and monochrome laser/LED technology. Heavy monthly duty cycles for large workgroups. Automated finishing like stapling and booklet making.

A photostat is a historic type of copying machine introduced in the early 1900s that photographed documents directly onto rolls of sensitized paper, or a copy made by that machine. Over time, the term became

a generic word for a photocopy or the act of photocopying documents.

How the Photostat Machine Worked: Used a large specialized camera containing a prism to photograph documents. Exposed an image directly onto large rolls of light-sensitive paper without using film. Produced a negative copy first (such as white text on a black background), which could be re-photographed to make a positive copy. Took roughly two minutes per complete print cycle.



Figure-3: Inventor: Oscar T. Gregory [Photostat].

Modern Usage and Meaning

General Copying: In many regions around the world (especially in South Asia), "photostat" or "stat" is still used in everyday speech to mean a standard paper photocopy or print shop service.

Historical Relic: True photostat machines were largely phased out as modern electrostatic copiers (like Xerox technology) became fast, cheap, and office-friendly later in the 20th century.

They both mean duplicate paper copies, but they are from different times and technologies. Today people use both words to mean a photocopy, but technically Photostat is an old-style photographic copy process, while Xerox is a company name that became a popular nickname for modern copying.

Key Differences

- **Photostat:** An early 1900s machine that took a literal photograph of a document using special rolls of paper.
- **Xerox:** A brand name for modern dry-ink machines (xerography) introduced in the mid-1900s.
- **Usage:** Both became generic words that everyday people use to ask for a photocopy.

The Photostat machine was invented in 1907 by **Oscar Gregory** in Kansas City, USA, and developed by the Commercial Camera Company. It functioned as a large, specialized camera that recorded documents directly onto rolls of sensitized photographic paper.

Year: 1907

How it worked: It used a built-in prism and lens to project a document's image straight onto massive rolls of

photographic paper rather than film or glass plates.

Distinction: Unlike modern plain-paper copiers (xerography, invented by Chester Carlson in 1938), the Photostat produced a mirror-reversed negative that had to be re-photographed if a positive reading copy was required.

The basic dry-copying process known as xerography was invented by Chester Carlson in 1938. Later, the Xerox Corporation introduced the world's first commercial plain-paper copier, the Xerox 914, on September 16, 1959.

Key Milestones

- 1937: Carlson starts working on electrophotography.
- 1938: Carlson makes his first successful copy.
- 1940s: The Haloid Company partners with Carlson to develop the tech.
- 1959: The Xerox 914 debuts and changes office work.

Xerox toner powder is a dry, fine mix made mostly of plastic polymer resin (85–95%), coloring pigments or carbon black (2–10%), and release wax (2–10%), combined with tiny flow-control additives.

Core Ingredients

Polymer / Plastic Resin: Styrene acrylate copolymer or polyester acts as the solid base that melts onto the paper.

Coloring Agents: Carbon black is used for black toner, while specialized organic pigments or metal-azo complexes provide cyan, magenta, and yellow.

Wax: Polypropylene or polyethylene wax stops the melted toner from sticking to the printer's hot fuser rollers.

Surface and Flow Additives

Fumed Silica: Tiny sand-like particles coat the mix to keep the powder dry and flowing smoothly.

Charge Control Agents: Metal complexes (like zinc or chromium compounds) help hold the correct static electric charge on the particles.

Iron Oxide: Used in specific magnetic toner formulas to guide the powder via magnetic fields.

A xerox (photocopier) machine consists of external body components, internal imaging mechanisms, and paper-handling assemblies. Major parts include the photoreceptor drum, fuser unit, toner cartridge, transfer roller, and document glass.



Figure-4: Xerox parts.

Internal Imaging Parts

- **Photoreceptor Drum:** A coated cylinder that holds the electrostatic image.
- **Fuser/Fixing Unit:** Heated rollers that melt and lock toner onto paper.
- **Toner Cartridge:** Holds the dry black or color ink powder.
- **Developer Unit:** Moves toner particles onto the drum.
- **Transfer Roller (or Corona Wire):** Pulls the toner image off the drum onto the paper.
- **Primary Charge Roller (PCR):** Gives the drum a uniform electrical charge.
- **Cleaning Blade:** Wipes extra toner off the drum after each copy.

Paper Path & Feeding Parts

- **Pick-up Rollers:** Rubber wheels that grab and pull paper from the tray.
- **Feed & Separation Rollers:** Ensure only one sheet moves forward at a time.
- **Paper Trays (1–4):** Internal drawers holding blank paper sheets.
- **Bypass Tray (Tray 5):** Manual slot for special paper sizes or envelopes.
- **Duplex Unit:** Flips paper automatically for double-sided copying.
- **Registration Roller:** Delays paper briefly to align it with the image on the drum.

External & Scanning Parts

- **Platen Glass:** The flat glass surface where originals are placed.
- **Document Feeder (ADF):** Automatic top tray that feeds multi-page documents.
- **Control Panel:** Touchscreen display and buttons for settings.
- **Output / Catch Tray:** Holds the finished printed copies.

A **Xerox machine** or printer has external user parts like the document glass, paper trays, and control panel, as well as internal hardware components like the toner cartridge, fuser assembly, and transfer roller. You can find specific replacement items directly through Xerox Supplies and Accessories.

A **Photostat copy** is an old photographic paper duplicate made with a camera-like machine. A Xerox copy is a modern dry duplication made using electrostatic charges and toner. While "photostat" names a vintage photographic process, "Xerox" is a brand name that people often use to mean any photocopy.

Technology and Process

Photostat: Uses a special camera to take a picture of a document on roll film. It uses liquid chemical baths to develop prints. It often creates a negative image first (white text on a black page).

Xerox: Uses dry powder toner and static electricity. It uses light and heat to fuse the image onto plain paper instantly.

History and Usage

Photostat: Invented in the early 20th century. It is an outdated, slow, and uncommon method today.

Xerox: Named after the Xerox Corporation, which popularized commercial plain-paper copying in 1959. It became a common everyday word for making standard paper copies.

Xerography (Xerox) was invented by Chester Carlson in 1938, while the Photostat machine was developed earlier in the 1900s by the Commercial Camera Company.

Xerography (Xerox)

Inventor: Chester Carlson (physicist) and Otto Kornei [Otto Kornei (Born: 29 April 1903 in Wien; Died: 10 June 1993 in Monterrey)].

Year: October 22, 1938 (first successful test copy).

Key Milestone: The Xerox 914 plain-paper copier launched in 1959, created by the Haloid Company (later renamed Xerox Corporation).

Photostat Machine

Inventor/Company: Developed by the Commercial Camera Company (later the Photostat Corporation).

Year: The decade of the 1900s.

Key Milestone: It used a large, specialized camera to make direct photographic copies onto rolls of sensitized paper, long before electronic dry-toner copiers existed.

Xerox toner (often historically called "dry ink") is not a liquid ink. It is a fine, dry powder mixture primarily composed of plastic polymers, coloring pigments, wax, and specialized charge-control agents.

Main Chemical Components

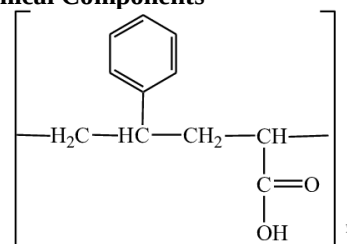


Figure-5: Styrene-acrylic copolymers.

Polymeric Resins (Plastic): Makes up the largest portion (around 85–95%) of the toner. Common polymers include polyester or styrene-acrylic copolymers, which melt under heat to permanently bond to the paper. Styrene acrylic copolymer serves as a primary thermoplastic binder resin in Xerox and other laser printer toners. It fuses fine color or black pigments to paper via thermal roller fusers, providing balanced gloss, mechanical durability, and controlled electrostatic charging.

Key Properties in Toner Formulation

Glass Transition (T_g): Tuned via monomer ratios so it remains a rigid powder at room temperature, yet melts cleanly under printer fuser heat. The glass transition temperature (T_g) is the point where a polymer or amorphous material changes from a hard, brittle, glassy state to a soft, flexible, rubbery state. Below (T_g), molecular chains are locked; above it, they move freely. Common values include PVC at 80°C and polystyrene at 97°C.

How (T_g) Works

Glassy State: Below (T_g), materials are stiff, hard, and break easily like glass.

Rubbery State: Above (T_g), the material becomes soft, flexible, and pliable.

Not Melting: (T_g) is not a melting point (T_m), which occurs in crystalline structures. (T_g) happens only in amorphous regions where polymer chains gain movement.

Hard/Soft Segments: Styrene acts as the rigid component, while acrylic esters (like butyl acrylate) provide flexibility for low-temperature fixing.

Charge Control: Facilitates reliable triboelectric charging characteristics for precise electrostatic transfer onto paper.

Key Properties

Hard and flexible mix: Styrene makes it hard, while acrylic keeps it bendable.

Water proof: Stops water from passing through.

Sticks well: Grabs tight to stone, wood, and metal.

Alkali stable: Works great with cement.

Common Uses: Wall paint: Used in indoor and outdoor house paints.

Building glue: Mixed into tile glues and wall putties.

Waterproofing: Seals roofs and wet concrete.

Cosmetics: Acts as a binder or opacifier in skin care items.

Comparison with Polyester Binders

Gloss & Vibrancy: Offers superior color gloss and clarity, making it popular for graphic and color laser printing. **Market Position:** Competes with polyester resins, which dominate lower-cost, high-volume office printing due to broader fusing windows and stable thermal properties.

Pigments/Colorants: Provides the color, typically carbon black for black toner or specialized organic

pigments and dyes (cyan, magenta, yellow) for color printing.

Waxes: Low melting-point waxes are embedded inside or mixed with the particles to act as a release agent so the toner doesn't stick to the printer's hot fuser rollers.

Charge Control Agents & Silica: Tiny amounts of fumed silica and metal complexes are added to the surface of the particles to improve flowability and ensure the powder holds the correct electrostatic charge.

Quickprint (or QwikPrint) is most commonly refers to self-service, instant document-printing kiosks or software tools that let you upload files from your phone or computer and print them immediately without navigating standard printer setup or long queues.



Figure-6: Qwik Print.

Self-Service Print Kiosks

Scan and upload: You scan a unique QR code on the machine with your phone.

Select files: You upload your documents directly from your device or cloud storage (like Google Drive).

Pick options: You choose color or black-and-white, page orientation, and number of copies.

Get prints: You enter a secure code (OTP) or scan a release code to get your physical copies in under a minute.

Software and E-Commerce Features

Browser extensions: One-click toolbar buttons or shortcuts (Ctrl + Shift + P) that bypass normal multi-step print menus in web browsers.

Business tools (like Shopify or OpenCart): Bulk-printing plugins that let managers instantly print invoices, shipping labels, or receipts with a single click.

Enterprise or network printing: Driverless browser-based portal tools (like MicroFocus iPrint) that convert documents into a ready-to-print format on the fly.

A Xerox is a physical photocopy made from an existing paper document using an optical machine. A quickprint (or digital printout) is a document printed directly from a

digital file like a PDF or Word document sent from a phone, USB, or computer.

Key Differences

Xerox: Requires a physical piece of paper to scan and duplicate. Uses light and toner to reflect and copy an image directly onto blank paper. Can lose a small amount of sharpness if copied repeatedly; text can fade faster over time. Best for duplicating hard-copy paperwork, IDs, or forms quickly.

Quickprint: Requires a digital file stored electronically. Best for outputting fresh documents, reports, or tickets sent via email or cloud storage. Uses digital data instructions (laser or inkjet) to paint a brand-new image or text onto paper. Produces sharp, clear, and uniform copies directly from the original digital source.

Qwikprint is an automated, 24/7 self-service printing kiosk network invented in India by young entrepreneurs Pranav Senthil and Senthil Tamilarasan. Launched around June 2025, these ATM-like machines let users upload documents via a QR code scan and print files in under 60 seconds without needing a shopkeeper.

How the Qwikprint Machine Works: Scan the unique QR code on the kiosk screen with a phone camera.

Upload: Select and upload your document from your phone or cloud storage.

Configure: Choose preferences like color, black-and-white, number of copies, and orientation.

Collect: Enter your OTP or scan the payment/collection code to grab your printout instantly.

Purpose and Availability

Invention Spark: Created to solve student and corporate frustrations with closed, slow, or long-queued traditional photocopy shops.

Locations: Placed in high-footfall areas like college campuses (including recent expansions in Kolkata and other major cities), tech parks, and coworking spaces.

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The **QwikPrint** automated self-service printing kiosk was invented and founded by **Pranav Senthil**, alongside co-promoter **Senthil Tamilarasan**, under their company QwikPrint Technologies Private Limited based in Tamil Nadu, India.

About the Invention

Concept: Operates like an ATM for documents, allowing 24/7 self-service printing without a shopkeeper or counter staff.

How it Works: Users scan a unique kiosk QR code, upload documents from a phone or laptop, complete payment digitally, and collect printouts in under 60 seconds using an OTP.

Deployment: Installed across major Indian college campuses, corporate offices, and co-working spaces.

Conclusion: Xerography is a dry printing and copying technique that uses static electricity and light to attract and fuse toner onto paper. Invented in 1938 by Chester Carlson, the name comes from the Greek words xeros (meaning "dry") and graphia (meaning "writing"). It is the core technology behind modern office photocopiers and laser printers. How Xerography Works: The xerographic process relies on basic rules of static electricity and photoconductivity (materials that change electrical properties when exposed to light)

Charging: A drum or plate gets a uniform static electric charge.

Exposure: Light reflects off a document and hits the drum. Light areas lose their charge, while dark areas keep a latent electric image.

Inking: Dry powder toner with an opposite electrical charge sticks to the charged areas.

Transfer: The toner transfers from the drum onto a sheet of paper.

Fusing: Heat and pressure melt the toner permanently onto the paper.

A quick print is a software function or self-service tool that bypasses normal setup menus to send a document straight to a printer. It uses default settings to print instantly, or refers to automated kiosks where users can upload and pick up physical printouts in seconds.

Main Meanings of Quick Print

Software Feature: In programs like Microsoft Office or web browsers, it skips the print preview window and sends the file directly to your default printer.

Self-Service Kiosk: Automated public machines (such as Qwikprint) that let you scan a QR code, upload a file from your phone, pay, and get a physical paper printout in under a minute.

Book and Document Services: Streamlined services (like Pothi.com) that convert digital PDF files directly into

physical personal books or single copies without custom editing steps.

Browser Extensions: One-click tools added to web browsers to print web pages instantly without navigating menu.

Qwikprint provides self-service, 24/7 instant printing kiosks that are important for colleges because they eliminate long queues at traditional print shops, meet statutory campus facility requirements without extra staffing overhead, and let students securely print assignments in under 60 seconds.

REFERENCE

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